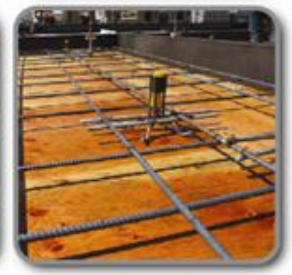
I-215 East; near 3900 South Accelerated Concrete Pavement Precast Panels

Dave Gilley, Plant Manager

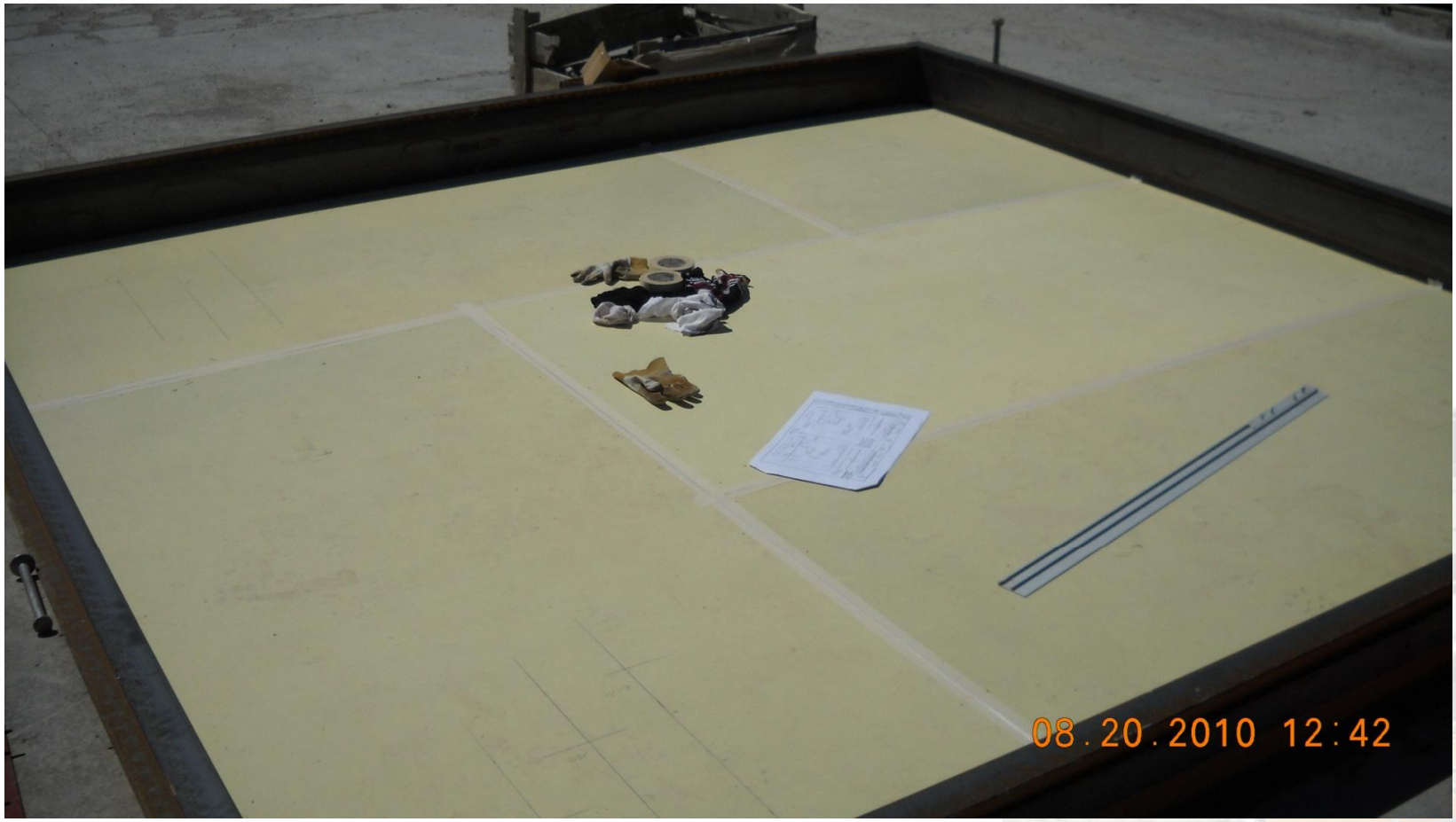
Harper Pre-Cast



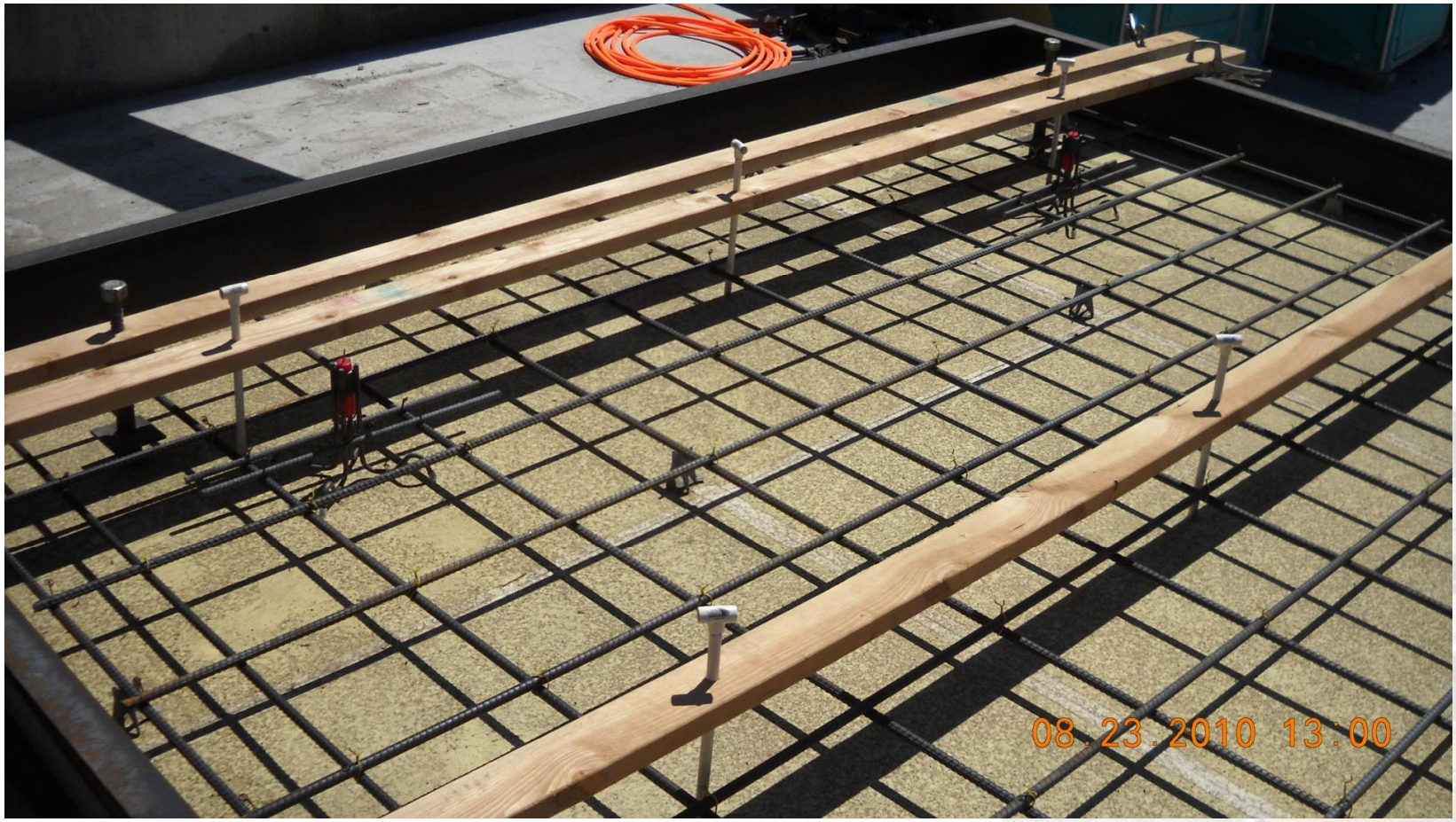
Panel Specifications for Urethane/Coil Loop Type PCPP

- Form size: 12’0”x12’0”x9”
- Concrete: Class AA(AE) 4000 PSI
- #4 Grade 60 none coated rebar
- 1” leveling bolts: 4 required
- 1” coil loop lift inserts: 4 required
- 5/8” Urethane grout ports: 9 required
- Surface finish: Light broom

PCPP Form 12’0”x12’0”x9”



1st View Urethane Type PCPP Completed Form ready for Concrete



2nd View Urethane Type PCPP Completed Form Ready for Concrete

Start Concrete Pour

Concrete Pour

Removal of Grout Tube and Bolt Locator Jigs

Finished top of Urethane Type PCPP

1st Lift of Urethane Type PCPP

Panel Specifications for Grout/ Swift Lift Type PCPP

- Form Size: 12’0”x12’0’’x9”
- Concrete: Class AA(AE) 4000 PSI
- #4 Grade 60 none coated rebar
- 1’ Leveling Bolts: 4 Required
- 8 Ton Swift Lift lifting Inserts: 4 Required
- 1 ½” Grout ports: 9 Required
- Surface Finish: Light Broom

View 1 Completed Form for Grout Type PCPP

View 2 Completed Form for Grout Type PCPP

Concrete Pour of Grout Type PCPP

Finish Process of Grout Type PCPP

1st Lift Grout Type PCPP

Underside View Grout Type PCPP

Mock Test Roadway Urethane Type PCPP

- Mock Road Way preparation Urethane Type PCCP
- Set leveling sand for sub-base
- Create Leveling bolt placement layout
- Set leveling bolt plates
- Place test panels
- Check plate displacement
- Start urethane injection

Preparation of Mock Roadway

Sand Screed for Proper Elevation

Leveling Bolt Plate Placement Layout

Leveling Bolt Plate Placement

Test Fit Panel

Leveling Bolt Plate Displacement Evaluation

Lessons Learned and Recommendations

- Use a thinner layer of material as sub-base
- Use a denser, finer material to avoid displacement when the panel load is transferred to the leveling bolt plates
- Use a wider plate for leveling bolts

Replace Leveling Bolt Plates

Backer Rod Placement as Gasket for Urethane

Final Placement Urethane Type PCPP

Start Urethane Injection Preparation

Set Gages for Lift Monitoring

First Injection

Watch for Lift During Injection Process

Mock Test Roadway Grout Style PCPP

- Mock roadway preparation grout type PCCP
- Compact sub-base material
- Create leveling bolt plate layout
- Set leveling bolt plates
- Place test PCPP
- Start grout injection

Compaction of Sub Base

Create Leveling Bolt Placement Layout

Set Leveling Bolt Plates

Set Grout Type PCPP

Check Elevation

Check Movement of Leveling Bolt Plates

Repair and Replace Leveling Bolt Plates

Set Elevation of PCPP

Set Elevation of PCPP

Set Up Grout Injection Tools

Start Grout Injection

Lesson Learned

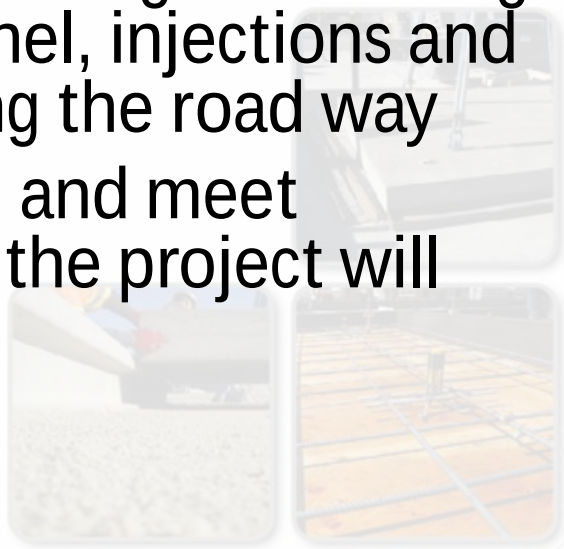
- Need a solid and more compacted sub-base us material
- Need a thinner layer of sub-base
- Need wider leveling bolt plates for better weight distribution.

Checking and Evaluating Urethane Injection Flow/Coverage

Checking and Evaluating Grout Flow/ Coverage

Lesson Learned Urethane Versus Grout

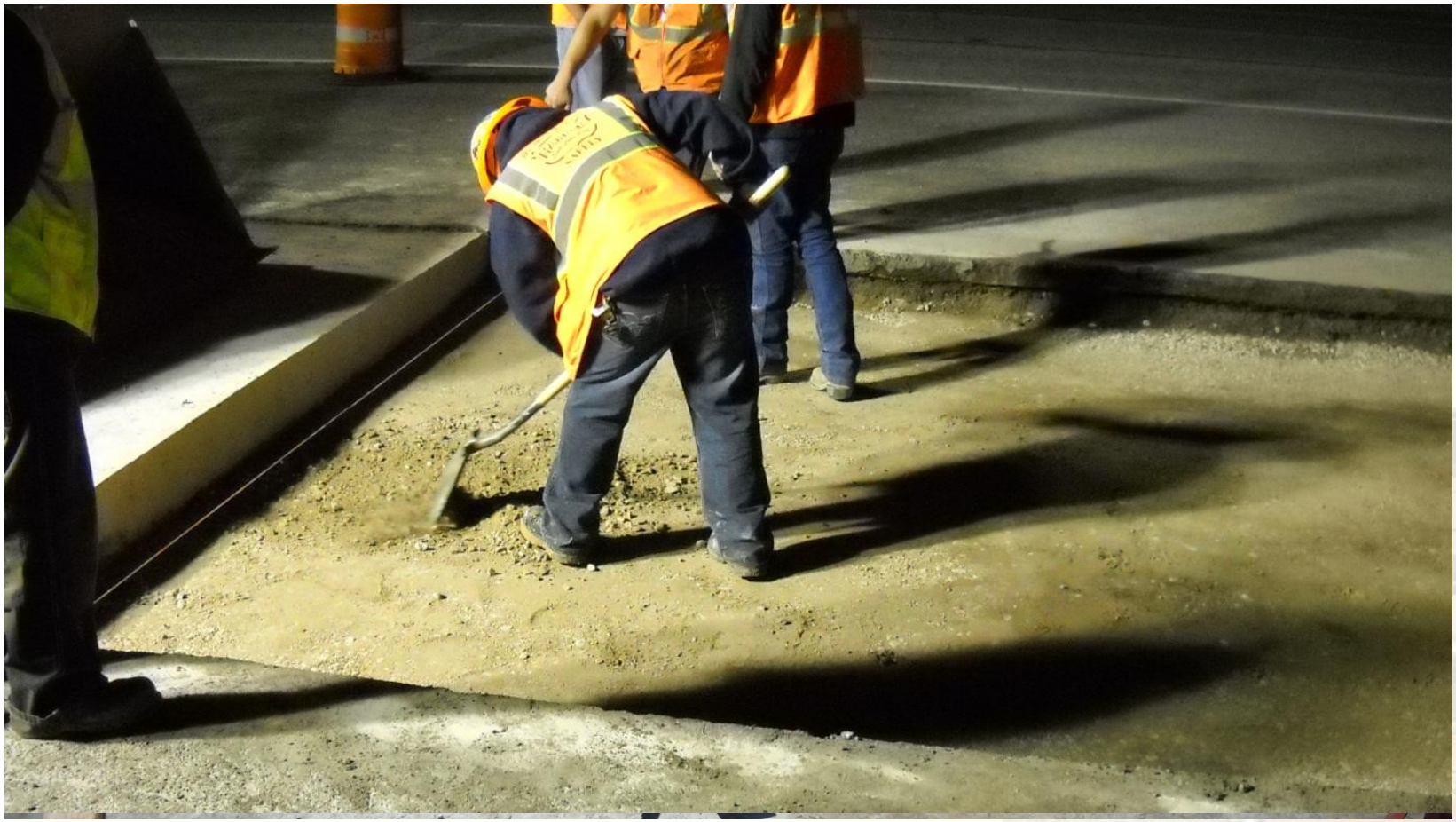
- Both materials flow and cover extremely well
- *Urethane* sets in 20 minutes which means opening the road faster, but because it sets so fast, it has the potential to lift the panel before the injection is completed, and can cause uneven load bearing
- *Grout* sets in 1 to 3 hours and show's no signs of setting up between injections or lifting of panel, injections and slow setting time may hold up opening the road way
- Conclusions: Both products work well and meet specifications. Time requirements of the project will determine which product to use



Start Install

- Location
- South Bound On Ramp I-215 & 3900 south
- Remove old roadway/Prep Sub-Base
- Set 3 Grout type PCPP
- Set 3 Urethane type PCPP
- Inject Grout
- Inject Urethane
- Asphalt Patch
- Open Road Way

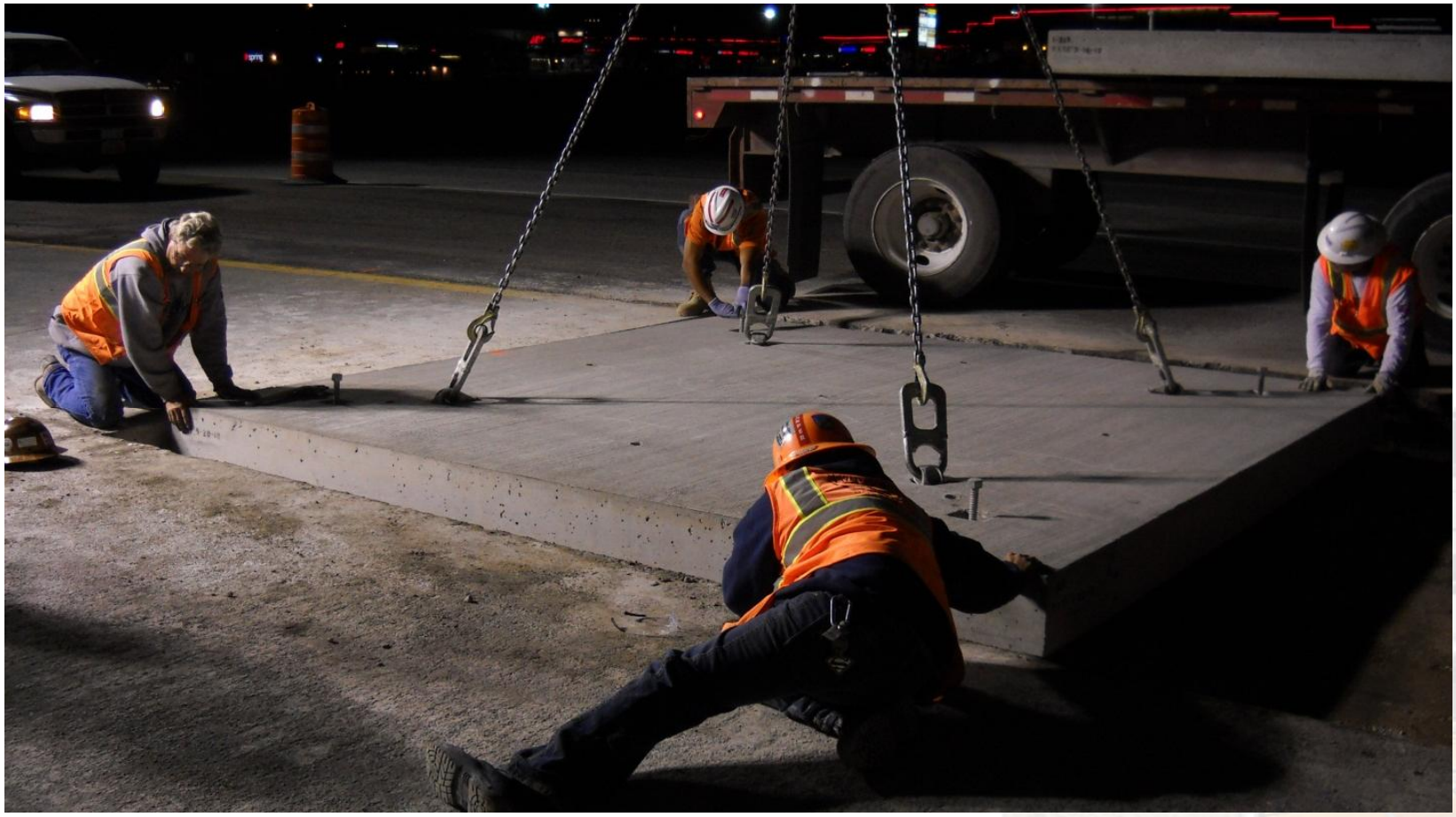
Install Preparation Dirt Work



Leveling Bolt Plate Layout

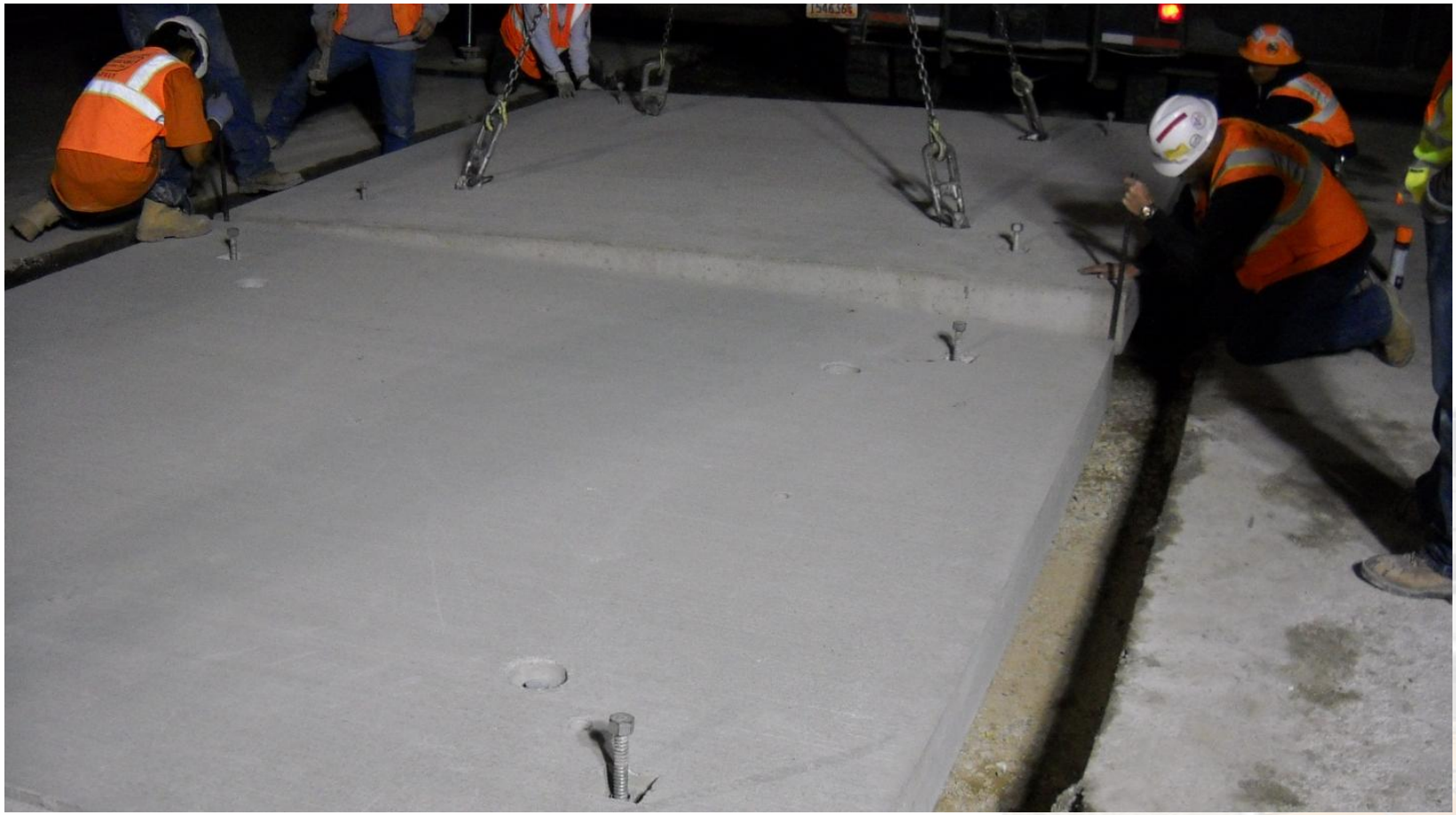
Final Placement Leveling Bolt Plate Locations

Set 1st Grout Type PCPP



Final Set, 1st Panel PCPP

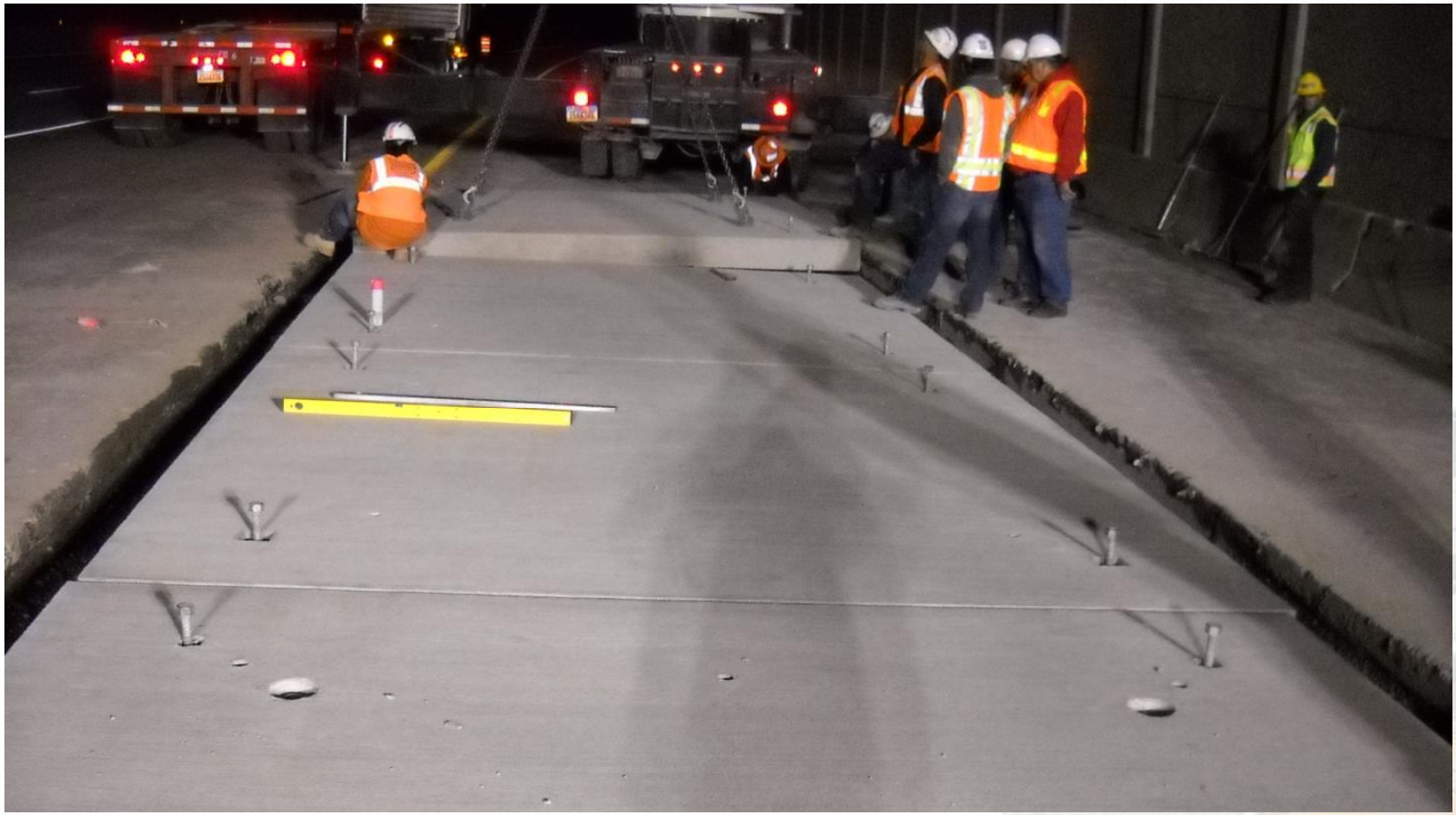
Set 2nd Grout Type PCPP



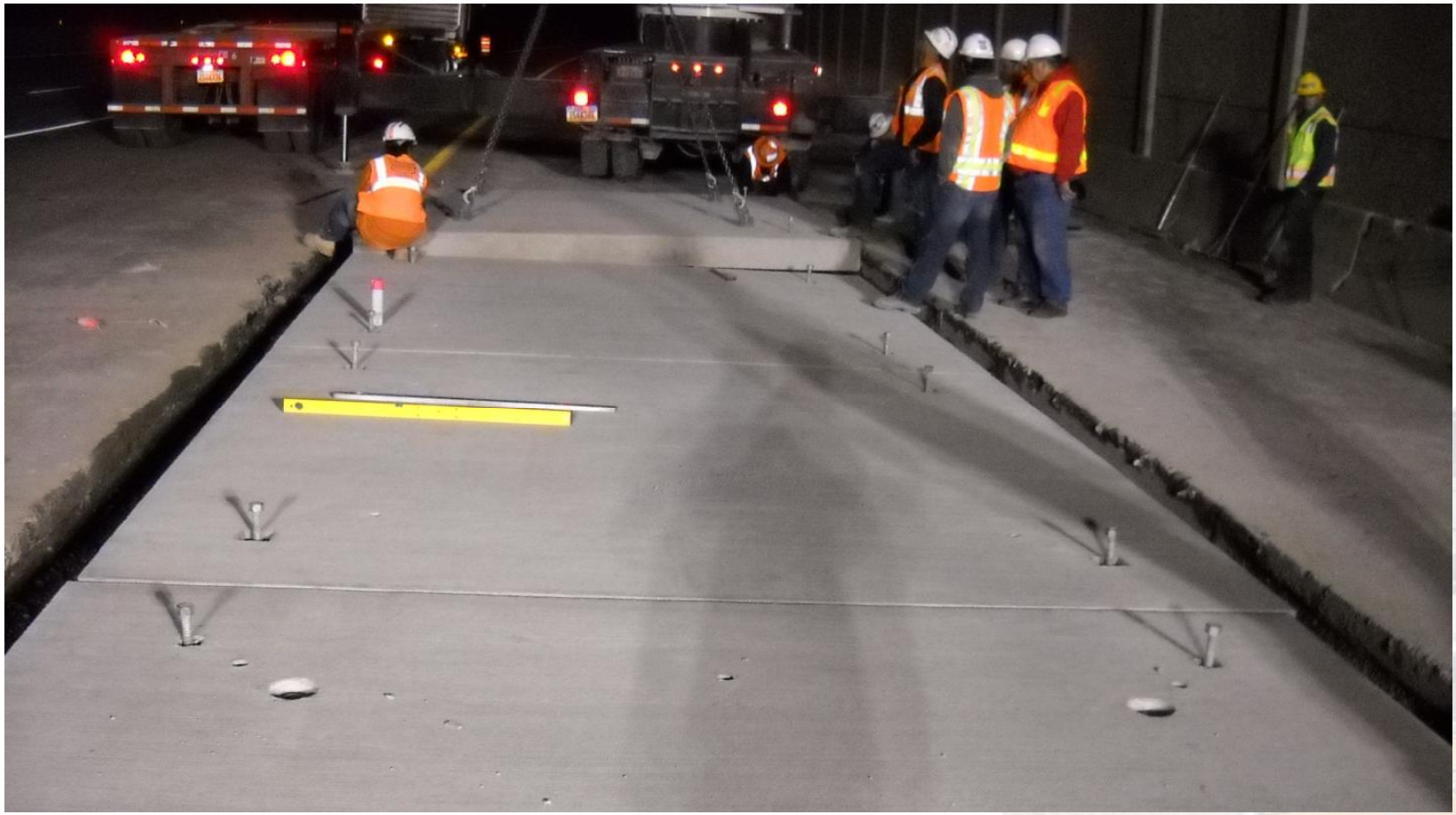
Set 3rd Grout Type PCPP

Start Grout Injection 1st PCPP

Set 4th Panel 1st Urethane Type PCPP



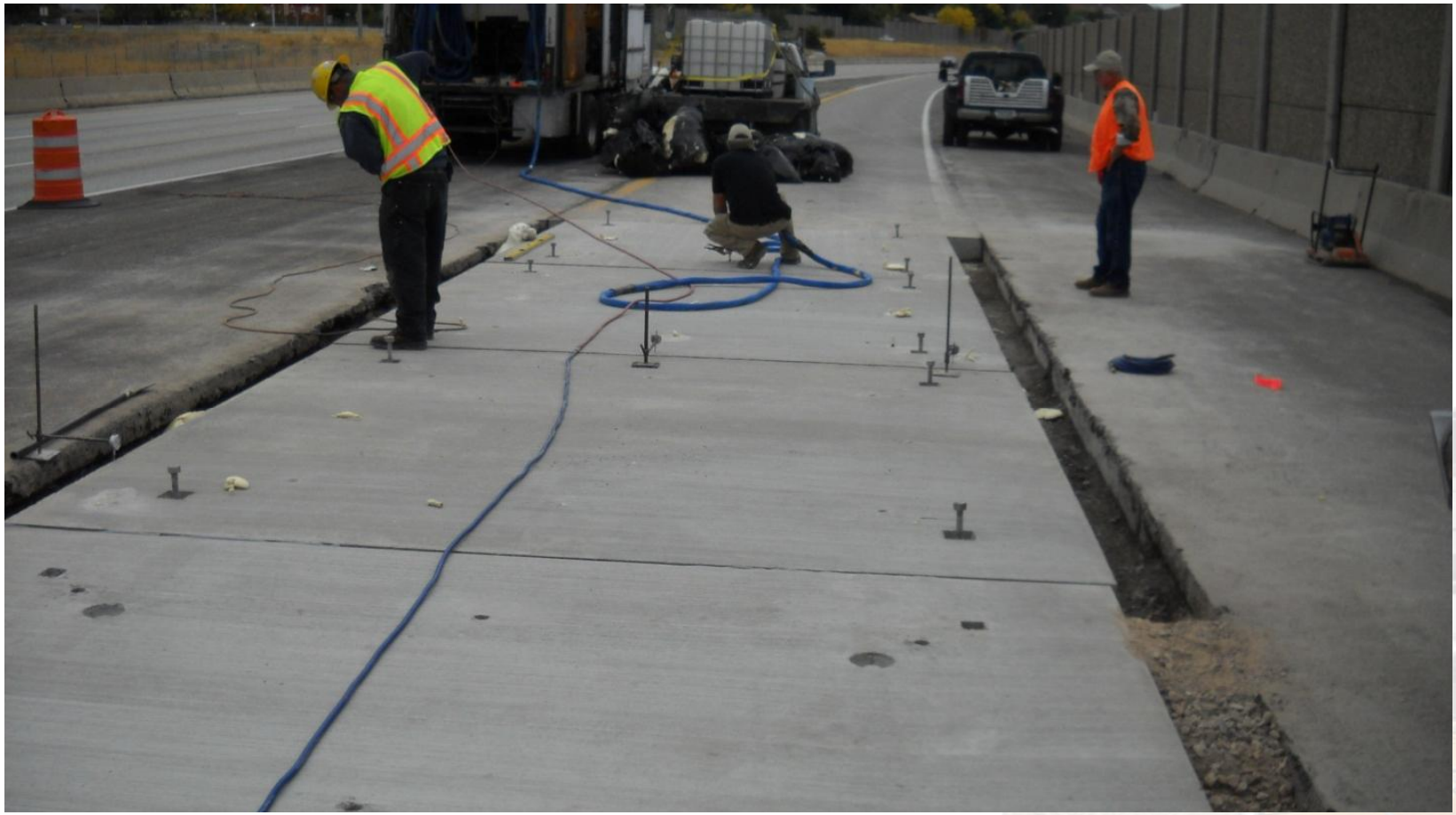
Set 6th Panel 3rd Urethane type PCPP



Start Urethane Injection

Monitor for Lift While Urethane Injecting

Finish Urethane Injection



Start Grouting Lift Points and Grout Ports

Finish of Grouting Lift Points and Grout Ports

Compaction of Partial Depth Road Base Fill

Finished PCPP Placement, Ready for Asphalt

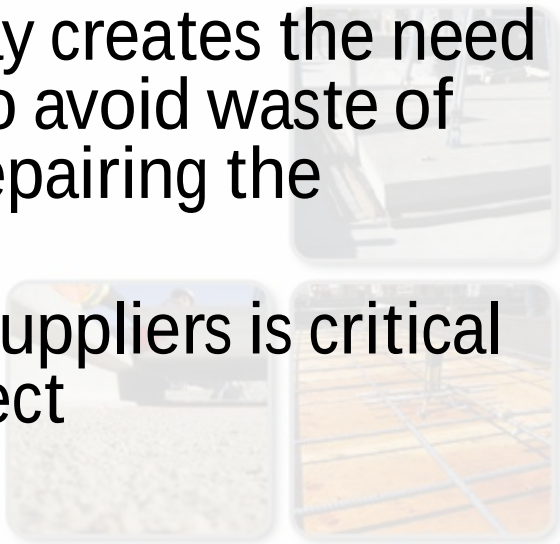
Start Asphalt Placement

Compaction at Partial Depth of Asphalt

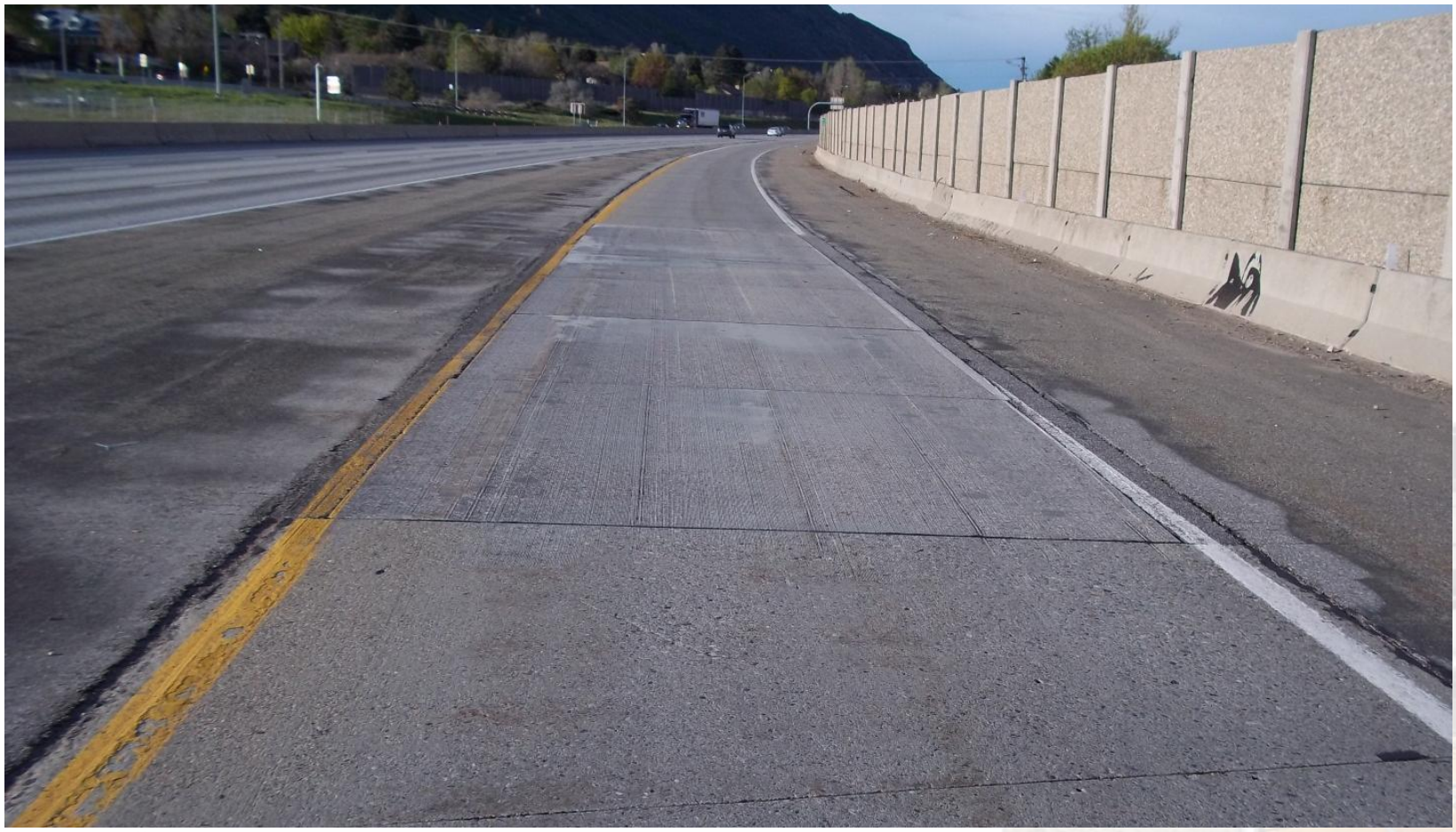
Final Compaction Asphalt, Top Layer

Lesson's Learned

- Proper sub-base work must be performed for a successful installation
- Setting and spacing of panels are critical. An exact layout or jig should be used for panel placement spacing, or a concrete saw should be on site for field modifications
- Over width cutting of existing roadway creates the need for some type of forming or control to avoid waste of grout or urethane and the need for repairing the overcut
- Scheduling sequence of all subs and suppliers is critical for the timely completion of the project



View Completed Test Section After 7 Months



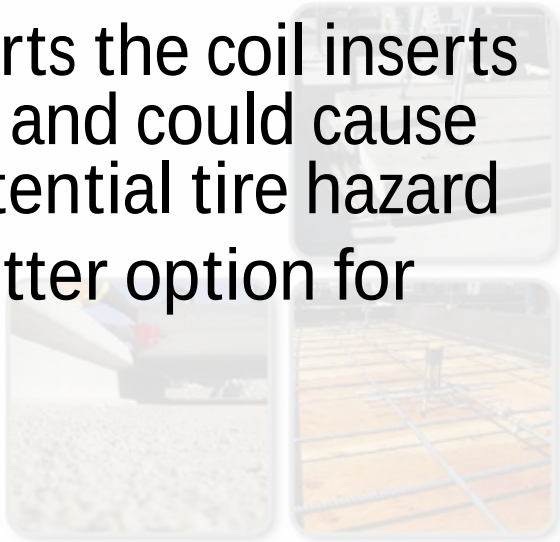
North View Completed Test Section After 7 Months

View of Grouted Swift Lift Style PCPP After 7 months

View of Grouted Coil Lift Style PCPP After 7 months

Lesson Learned/Recommendations

- Both types of panel stabilization appear to be performing well
- Urethane panels appear to be rising
- Grout type PCPP with Swift Lift picking devices the grout in the ports, leveling bolt and lifting points is holding up well
- Urethane type PCPP with Coil lift inserts the coil inserts have no coverage the insert is rusting and could cause premature panel failure as well as potential tire hazard
- Swift Lift system appears to be the better option for PCPP handling



Harper Precast

- Would like to thank UDOT for the opportunity to work on the research and development of this product and we look forward to working as a team for years to come
- Thanks